

ton's affidavit and in Northlake's own response brief mischaracterize the conclusions reached by the Federal Circuit in the appeal of the 1988 case.

Legally, even if the Court were to accept Hamilton's assertions in his affidavit and the inaccuracies in the response brief, Northlake has not made a valid case for the application of the doctrine of *res judicata*. *Res judicata* requires a contrary final decision. Northlake has not presented this Court with a final decision from another tribunal as to several of the samples. More importantly, however, Northlake has not presented this Court with any contrary decision, final or otherwise, regarding the three Belgian patents. Northlake attempts to support its *res judicata* argument with Hamilton's affidavit stating that the first two Belgian patents are "equivalent" to the two United States patents. The affidavit relies on a non-final decision in the 1988 suit relative to some but not all of the products of Northlake and one, but not both, of the United States patents.

The issue in the Belgian Court was validity and infringement of three Belgian patents. The validity was sustained and infringement was found. The United States Courts have no jurisdiction to determine the validity or infringement of foreign patents. Only a foreign country can determine the validity and infringement of the patents which it issues. Only a foreign country *See Stein Assoc. Inc. v. Heat and Control, Inc.*, 748 F.2d 653, 658 [223 USPQ 1277] (Fed. Cir. 1984). For a claim to be precluded under the doctrine of *res judicata*, the matter at issue must have been capable of resolution in the prior action. *Marsh*, 659 N.E.2d 171. The issue of the validity of the Belgian patents could not have been resolved in the 1988 suit, because that issue was only capable of resolution in a Belgian court.

In the 1988 suit (presently on remand) there are two United States patents involved. There is no final decision by any court as to infringement of the second United States patent. And even if the decision in the 1988 suit was final, it is only a decision on infringement of the United States patents. The Belgian tribunal considered three Belgian patents under Belgian law and the American tribunal (the 1988 suit) considered two United States patents under United States law. There is no *res judicata* effect of the 1988 suit as a matter of law.

Moreover, "even where the technical requirements of *res judicata* have been established, a court may nonetheless refuse to apply the doctrine." *International Harvester Co. v. Occupational Safety & Health Review Comm'n*, 628 F.2d 982, 986 (7th Cir.

1990). The Seventh Circuit does not maintain a strict approach to the doctrine, and advocates modification when needed or reasons rejection of the doctrine "when the events against it outweigh those in its favor." *Id.* In this case, even if Northlake were able to meet the requirements of the doctrine, the Court could use its discretion to reject the doctrine based upon the international principles of comity and mutual respect of sovereigns.

3. Public Policy

Northlake's third argument asserts that the Belgian Judgment should not be enforced because it "violates Indiana policy, and lacks fundamental fairness." (Northlake's Resp. to Pl.'s Mot. Summ. J. at 6.) Northlake is correct that, under Restatement §482, a court may deny enforcement of a foreign judgment if "the cause of action on which the judgment was based, or the judgment itself, is repugnant to the public policy of the United States or of the State where recognition is sought." Restatement (Third) of Foreign Relations Law of the United States, §482(2)(d) (1987). Northlake argues that enforcing the Belgian Judgment would violate Indiana public policy because it did not have the opportunity to conduct pretrial discovery in the Belgian litigation.

[3] Northlake's arguments here do not succeed for the same reason they did not succeed in its previous arguments regarding its opportunities for discovery in the Belgian Judgment. The degree of similarity the Belgian discovery procedures have with our own is not dispositive. *Ingersoll*, 833 F.2d at 688. The important consideration is the fundamental fairness of the procedures, and the Seventh Circuit has found that the procedures afforded by the Belgian judicial system were fundamentally fair. *Id.* Therefore, enforcement of the Belgian Judgment does not violate the public policy of the State of Indiana or of the United States.

CONCLUSION

Glaverbel's Motion for Summary Judgment is properly supported and there is no admissible evidence in opposition and no cognizable legal challenge to that motion or to the underlying Belgian Judgment. There are no disputed issues of fact, and international principles of comity requires this Court to enforce the Belgian Judgment unless one of the grounds for the denial of extension of comity exists. None of the defenses asserted by Northlake mandates that this Court refuse to recognize and enforce

the Belgian Judgment under the standards articulated by the Supreme Court in *Hilton* or in the Restatement of Foreign Relations Law of the United States. Accordingly, summary judgment for recognition/enforcement of the Belgian Judgment is GRANTED.

Glaverbel is awarded two million (2,000,000) Belgian francs. Glaverbel is also entitled to post-judgment interest from the date of entry of this Order, calculated pursuant to 28 U.S.C. § 1961. In addition, Glaverbel requested prejudgment interest in its motion for summary judgment. Pursuant to *Brooms v. Regal Tube Co.*, 881 F.2d 412, 424 (7th Cir. 1989), a district court may award prejudgment interest even if it is not requested in the Complaint, as long as the request is made by the time of post-trial motions. Accordingly, the Court awards Glaverbel prejudgment interest.

All awards granted to Glaverbel are subject to calculation of the prejudgment interest rate and current exchange rate as of the date of this Order. These rates will be determined and entered as part of the final judgment in this case within the next fifteen days. During that time period, the parties are invited to file with the Court any briefs addressing the Court's methods or sources for its calculation of the prejudgment interest rate.

U.S. Court of Appeals Federal Circuit

PPG Industries Inc. v. Guardian Industries Corp.

No. 97-1513

Decided October 1, 1998

PATENTS

1. Patent construction — Claims — Defining terms (§125,1305)

Use of term "consisting essentially of," preceding list of ingredients in composition claim, typically means that invention necessarily includes listed ingredients and is open to unlisted ingredients that do not materially affect basic and novel properties of invention; "consisting essentially of" claim occupies middle ground between closed claims that are written in "consisting of" format and fully open claims that are drafted in "comprising" format.

2. Patent construction — Claims — In general (§125,1301)

Federal district court, in construing claim for tinted glass composition drafted in "con-

sisting essentially of" format, was not required to determine whether iron sulfide, which is not among listed ingredients, could have material effect on basic and novel characteristics of claimed invention, since fact that claim contains some inherent imprecision resulting from use of term "consisting essentially of" does not mean that court, under rubric of claim construction, may give claim whatever additional precision or specificity is necessary to facilitate comparison between claim and accused product; rather, task of determining whether construed claim reads on accused product is for finder of fact.

3. Patent construction — Claims — Defining terms (§125,1305)

Specification of patent for tinted glass composition does not require that claim employing "consisting essentially of" language be construed to encompass composition having iron sulfide, which is not among listed ingredients, in amount present in accused product, even though specification states that residual amounts of melting and fining aids "such as SO₂" in glass "can vary and have no significant effect on the properties of the glass product," since plaintiff has not shown that person of skill in art would understand term "SO₂" to encompass all sulfur compounds, since interpretation that includes all sulfur compounds would call into question accuracy of statement in specification, and since plaintiff has not offered satisfactory alternative construction.

4. Infringement — Literal infringement (§120,05)

Substantial evidence supports jury's finding that presence of iron sulfide in tinted glass composition has material effect on basic and novel characteristics of invention of patent in suit, such that accused glass containing iron sulfide does not "consist essentially of" ingredients listed in asserted claim, since defendant introduced evidence, including deposition testimony from plaintiff's expert, tending to show that those of skill in art would regard even small changes in color or transmittance of tinted glass caused by iron sulfide to be material.

Particular patents — Chemical — Solar control glass

5,240,886, Gulotta and Shelestak, ultraviolet absorbing, green tinted glass, judgment of non-infringement affirmed.

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Appeal from the U.S. District Court for the Western District of Pennsylvania, Lancaster, Pa.

Action by PPG Industries Inc. against Guardian Industries Corp. for patent infringement. From judgment of non-infringement following jury trial, plaintiff appeals. Affirmed; Michel, J., dissenting in separate opinion.

Prior decision: 37 USPQ2d 1618.

Ford F. Farabow, Donald R. Dunner, and Darrel C. Karl, of Finnegan, Henderson, Farabow, Garrett & Dunner, Washington, D.C.; Arland T. Stein and Robert A. Matthews Jr., of Reed, Smith, Shaw & McClay, Pittsburgh, Pa., for plaintiff-appellant.

Robert G. Krupka, of Kirkland & Ellis, Chicago, Ill.; Jeffrey D. Mills, Jay I. Alexander, and Gregg F. LoCascio, of Kirkland & Ellis, Washington, D.C.; John M. Desmarais, New York, N.Y., for defendant-appellee.

Before Michel, Plager, and Bryson, circuit judges.

Bryson, J.

This case involves a type of glass composition known as "solar control glass," which is used to produce tinted automobile windows. PPG Industries, Inc., sued Guardian Industries Corp. in the United States District Court for the Western District of Pennsylvania, asserting that Guardian was infringing PPG's U.S. Patent No. 5,240,886 (the '886 patent) by marketing a type of solar control glass known as Solar Management Glass (SMG). After a ten-day trial, a jury concluded that SMG glass did not fall within the scope of the '886 patent claims. The district judge subsequently entered judgment on the verdict. On appeal, PPG argues that the district judge erred in construing the claims of PPG's patent and, alternatively, that substantial evidence did not support the jury's verdict of non-infringement. We affirm.

I

PPG and Guardian both manufacture green-tinted solar control glass. The glass filters out much of the ultraviolet and infrared radiation from the sun while maximizing the transmission of light in the visible spectrum. Infrared radiation transmits heat energy, and ultraviolet radiation can be damaging to materials. The capacity of solar

control glass to block the transmission of sunlight at those wavelengths, while remaining largely transparent to visible light, makes the product particularly well suited for use in automobile windows.

Guardian began selling SMG glass in 1992. PPG's '886 patent issued on August 31, 1993. After licensing negotiations failed, PPG sued Guardian for infringing the patent.

The '886 patent is directed to a green-tinted glass with specific light transmittance characteristics. The patent contains one independent claim, which reads as follows:

1. A green tinted, ultraviolet absorbing glass having a base glass composition consisting essentially of:

SiO ₂	68-75 weight %
Na ₂ O	10-20
CaO	5-15
MgO	0-5
Al ₂ O ₃	0-5
K ₂ O	0-5

and a colorant portion consisting essentially of:

CeO ₂	Less than 0.5 weight %
Total iron (as Fe ₂ O ₃)	Greater than 0.85 weight %
FeO/total iron	Less than 0.275

exhibiting ultraviolet transmittance no greater than 31 percent (300 to 390 nanometers) and luminous transmittance (illuminant A) of at least 70 percent; both at a reference thickness of 3.9 millimeters.

Claim 4, the only claim asserted against Guardian at trial, adds an additional limitation that the glass must exhibit a total solar energy transmittance of less than 45 percent at a reference thickness of 3.9 millimeters.

The '886 patent identifies iron and cerium oxide as colorants. Iron may be present in either the ferrous (Fe²⁺) or ferric (Fe³⁺) states. Ferrous iron gives the glass a greenish tint and is an infrared radiation absorber. Ferric iron gives the glass a yellowish tint and acts to absorb ultraviolet radiation.

One of the advantages of the invention described by the '886 patent is that the glass requires only minimal amounts of cerium oxide to achieve the desired light transmittance properties. Cerium oxide is expensive and presents special difficulties in the manufacturing process. PPG's patent teaches that using relatively high concentrations of iron oxides as colorants and maintaining the glass composition at a low redox ratio (the ratio of ferrous iron to total iron) reduces or eliminates the need for cerium oxide in the glass. Guardian's SMG glass

uses similarly high levels of iron oxide as a colorant and uses no cerium oxide.

PPG and Guardian use similar technologies to produce tinted glass. The glass is produced by the "float" process, which refers to the method of cooling the glass after it exits the furnace by floating it on a pool of molten tin. The tin provides an extremely flat surface for cooling the glass, so that sheets of glass can be produced at precise, uniform thicknesses.

Two features of the float process are particularly pertinent to the current dispute. The raw materials for the glass are typically added together in a furnace, where they are mixed and melted. As the various glass constituents melt, they release gas. That is potentially a problem because some of the gas may remain trapped in small bubbles in the glass. If the bubbles remain in the final product, they result in visible imperfections in the glass. To avoid that problem, various melting and fining aids are added to the glass mixture in the furnace. Sodium sulfate (Na₂SO₄) is one such additive. In the mixture, much of the sulfate decomposes into sulfur dioxide and oxygen. Those gases cause the trapped gas bubbles to dissipate, leaving few visible imperfections in the glass. Some of the sulfate introduced into the batch remains dissolved in the glass composition, but it is colorless and has no effect on the transmittance properties of the glass.

The second pertinent feature of the process is the interaction between the glass and the pool of molten tin on which it floats after exiting the furnace. Both Guardian's SMG manufacturing process and PPG's patent specification require that the glass be produced at a low redox ratio, which means that the glass is produced under oxidizing conditions. Although the redox ratio is commonly reported for the glass as a whole, oxidation conditions are considerably different at the boundary of the glass and the molten tin. That interface zone experiences strong reducing conditions, resulting in a high redox ratio. Under those conditions, oxygen atoms are stripped away from the sulfate remaining in the glass, reducing it to sulfide ions (S²⁻). When the sulfide ions combine with ferric iron, the resulting compound (FeS₂) imparts a yellowish-brown coloration to the glass. Testimony at trial indicated that iron sulfide formation could be observed to a depth of about 20 microns from the glass surface contacting the molten tin. That narrow band is commonly referred to as the "tin layer" of the glass.

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At the inception of this suit, the chemistry of the tin layer was not an issue. PPG sought a preliminary injunction and Guardian defended on the ground that SMG glass contained iron sulfide, an ingredient unlisted in PPG's patent, as a colorant. The district judge credited testimony from PPG's experts that iron sulfide could not form in Guardian's glass because of the low redox ratio at which the glass was produced. As a result, the district judge rejected Guardian's "sulfide defense" and granted a preliminary injunction. On appeal, this court affirmed. See *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1565, 37 USPQ2d 1618, 1624 (Fed. Cir. 1996).

By the time of trial, Guardian had refined its non-infringement position. While Guardian still claimed that the presence of iron sulfide differentiated SMG glass from PPG's patent, Guardian now identified the primary source of the iron sulfide as the tin layer of the SMG glass. Witnesses for each side agreed that the iron sulfide in the tin layer of the SMG glass resulted in a 0.5% change in total light transmittance and a small change in color, measured by a 3 nanometer shift in the dominant wavelength of the light transmitted by the glass. PPG argued that the small changes in the properties of the glass attributable to the iron sulfide in the tin layer did not avoid infringement of the claims of the '886 patent. PPG also contended that the iron sulfide in the tin layer was an inherent byproduct of the float glass manufacturing process used by both Guardian and PPG. The jury, however, returned a verdict in Guardian's favor, finding that the SMG glass did not infringe the '886 patent. In view of its infringement verdict, the jury did not reach the merits of Guardian's invalidity defense. PPG appealed the denial of its motions for judgment as a matter of law and for a new trial.

II

[1] PPG contends that the district judge improperly construed the term "consisting essentially of" in the '886 patent and that the jury verdict must be vacated because it was based on an incorrect claim construction. "Consisting essentially of" is a transitional phrase commonly used to signal a partially open claim in a patent. Typically, "consisting essentially of" precedes a list of ingredients in a composition claim or a series of steps in a process claim. By using the term "consisting essentially of," the drafter signals that the invention necessarily includes the listed ingredients and is open to

unlisted ingredients that do not materially affect the basic and novel properties of the invention. A "consisting essentially of" claim occupies a middle ground between closed claims that are written in a "consisting of" format and fully open claims that are drafted in a "comprising" format. See *Ex parte Davis*, 80 USPQ 448, 449-50 (Pat. Off. Bd. App. 1948); *Manual of Patent Examining Procedure* § 2111.03 (6th ed. 1997).

The district judge's instructions to the jury closely tracked the established definition of the phrase "consisting essentially of." The jury was instructed that "consisting essentially of" means that "the claimed glass invention has in it the ingredients that are specifically identified in the claim. . . . Other ingredients may also be present in the glass, although not specifically identified in the claim, so long as those other unlisted ingredients do not have a material effect on the basic and novel characteristics of the glass." PPG and Guardian agreed that the basic and novel characteristics of the glass are color, composition, and light transmittance. The court added that an ingredient has a material effect on the characteristics of the glass "if the effect is of importance or of consequence to those of ordinary skill in the art of glass making." The jury was further instructed that it was to determine as a factual matter "whether the presence of sulfur found in the sulfide form has a material effect on the basic and novel properties of the glass."

PPG raises two issues with respect to the district judge's instructions. First, PPG argues that the determination whether iron sulfide has a "material effect" on the invention is a matter of claim construction and that the judge erred in placing that issue before the jury as part of the infringement determination. Second, PPG argues that the judge failed to construe the term "material effect" in a manner consistent with the patent specification, leaving the jury free to apply a different test as to what constitutes a material effect on the total light transmittance and color of the glass.

A

PPG's broadest argument is that the district judge was required to determine as a part of claim construction whether iron sulfide could have a material effect on the basic and novel characteristics of the claimed glass. PPG begins with the premise that a patentee is entitled to have the meaning and scope of its patent determined as a

matter of law. See *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979, 34 USPQ2d 1321, 1329 (Fed. Cir. 1995) (in banc), *aff'd*, 517 U.S. 370, 38 USPQ2d 1461 (1996). That principle is undetermined, argues PPG, by allowing juries to determine whether a particular unlisted element has a material effect on the invention. Because two different juries could come to different conclusions with respect to the materiality of the same unlisted ingredient, PPG contends, the claim has not been construed with sufficient specificity.

[2] Claims are often drafted using terminology that is not as precise or specific as it might be. As long as the result complies with the statutory requirement to "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention," 35 U.S.C. § 112, para. 2, that practice is permissible. That does not mean, however, that a court, under the rubric of claim construction, may give a claim whatever additional precision or specificity is necessary to facilitate a comparison between the claim and the accused product. Rather, after the court has defined the claim with whatever specificity and precision is warranted by the language of the claim and the evidence bearing on the proper construction, the task of determining whether the construed claim reads on the accused product is for the finder of fact. See, e.g., *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 842 F.2d 1275, 1280, 6 USPQ2d 1277, 1282 (Fed. Cir. 1988) (whether claim limitation of "about 100% per second" is literally met is a question of fact).

The proper allocation of the tasks of construing a claim and determining infringement in a case in which a claim contains an imprecise limitation is demonstrated by our decision in *Modine Manufacturing Co. v. United States International Trade Commission*, 75 F.3d 1545, 37 USPQ2d 1609 (Fed. Cir. 1996). In *Modine*, the patentee had claimed a condenser for an automotive air conditioning system with "relatively small" hydraulic diameters. *Id.* at 1549. From the specification and prosecution history of the patent, this court concluded that the term "relatively small" should be interpreted as referring to a range of diameters of "about 0.015-0.040" inches. *Id.* at 1554. Instead of attempting to define that range more precisely, we remanded the case for a factual determination of whether the claim limitation was literally infringed by accused products having diameters ranging from 0.0424 to 0.0682 inch. *Id.* at 1554-55.

Like the patents at issue in *Modine* and *Gore*, the '886 patent contains some inherent imprecision resulting from the use of the term "consisting essentially of." As PPG points out, it is possible that under such circumstances different finders of fact could reach different conclusions regarding whether the effect of a particular unlisted ingredient in an accused product is material. That possibility, however, is a necessary consequence of treating infringement as a question of fact subject to deferential review. It does not mean that the claim was improperly construed as an initial matter.

B

PPG further argues that even if the jury was correctly delegated the task of deciding whether iron sulfide in SMG glass materially affects the properties of the glass, the definition of "consisting essentially of" given to the jury should have reflected information in the patent specification concerning what effects the inventors considered to be material. Under well-settled principles, PPG was entitled to provide its own definition for the terms used in its patent claim, including the transition phrase "consisting essentially of." In *Water Technologies Corp. v. Calco, Ltd.*, 850 F.2d 660, 666, 7 USPQ2d 1097, 1102 (Fed. Cir. 1988), for example, this court looked to the prosecution history of a patent to determine whether an unlisted ingredient was excluded from the scope of a "consisting essentially of" claim. Thus, PPG could have defined the scope of the phrase "consisting essentially of" for purposes of its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention. The question for our decision is whether PPG did so.

PPG argues that it provided such a definition of materiality, basing its argument on a sentence in the specification that describes the method of producing the claimed glass composition. That sentence states that "[in]jecting and fining aids such as SO₂ are useful during production of the glass, but their residual amounts in the glass may vary and have no significant effect on the properties of the glass product." PPG asserts that one of skill in the art would understand the term "SO₂" to encompass all sulfur compounds, including iron sulfide. Because the specification teaches that residual amounts of melting and fining aids such as SO₂ have no significant effect on the properties of the

glass, PPG argues that the effect of any iron sulfide in the glass recited in the claims must be deemed not to be material. Essentially, PPG is arguing that the reference to SO₂ in the specification means that regardless of what effect sulfur compounds such as iron sulfide have on the properties of the glass, the effect cannot be considered "significant" for purposes of the '886 patent. PPG's argument necessarily depends on its assertion that "SO₂" should be ascribed a meaning in the patent different from its ordinary meaning as the chemical formula representing a molecule containing one sulfur atom and three oxygen atoms. Although the specification is silent on that point, PPG was entitled to produce extrinsic evidence to show how one of skill in the art would interpret "SO₂" in the context in which it was used. See *Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1216, 36 USPQ2d 1225, 1228 (Fed. Cir. 1995).

The principal evidence on this point adduced by PPG was testimony that it is a common practice in the glassmaking art to report the weight percent of sulfur in glass as "SO₂" regardless of the form in which the sulfur is actually present. That practice was apparently adopted as a convention because the most convenient ways of measuring the amount of sulfur in glass do not distinguish among the various sulfur compounds.

[3] While not disputing that "SO₂" is frequently used to denote the amount of sulfur in glass, Guardian introduced evidence to show that one of skill in the art would not believe that "SO₂" in the critical specification sentence was intended to cover all forms of sulfur. Instead, Guardian argued that "SO₂" as used in the specification, refers only to the dissolved sulfate retained in the glass composition.

Guardian notes that the sentence on which PPG relies is directed to the use of "melting and fining aids" in glass. While sulfate is a well-known fining aid in glass, Guardian points out that other sulfur compounds are not suitable for use in that capacity. For that reason, Guardian argues, one of skill in the art would not expect a reference to "SO₂" in the context of melting and fining aids to encompass wholly different sulfur compounds, such as iron sulfide, with entirely different properties.

Guardian also argues that the reference to "SO₂" must be limited to dissolved sulfates because an interpretation that includes all sulfur compounds would call into question the accuracy of the statement in the specification that the "residual amounts [of SO₂] in the glass can vary and have no

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significant effect on the properties of the glass product." Witnesses for both parties agreed that residual sulfate in the glass could vary substantially as a result of the production parameters without having a measurable effect on the resulting glass product. Because iron sulfide is a strong colorant, however, the properties of the glass would vary significantly with the amount of sulfur in the glass in the form of iron sulfide. Accordingly, we interpret the sentence in the specification to refer only to sulfate; interpreted in that manner, the sentence accurately describes the effect of sulfate in the glass as insignificant.

We are fortified in our interpretation of the specification by the fact that PPG has not offered a satisfactory alternative construction. PPG's position at trial was that a "significant" change in the glass properties is one that results in a glass product that does not satisfy the color or transmittance limitations of the patent claims. That proposed definition is suspect, however, because it would mean that any residual sulfur compound in the glass composition could avoid the "consisting essentially of" limitation only by taking the glass outside the other limitations of the patent. If that definition of "significant effect" were adopted, it would have the effect of converting the critical claim language from "consisting essentially of" to "comprising." PPG's witnesses cast further doubt on the correctness of PPG's proposed construction by agreeing that "in the context of science," large changes in glass properties that still fell within the color and transmittance limitations of the claim would be considered significant. We therefore reject PPG's argument that the specification requires that the claims of the '886 patent be construed to encompass glass products that contain iron sulfide in any amount, as long as the accused products satisfy the other limitations of the claims.

PPG makes the further contention that the claim construction adopted by the district court must be incorrect because it would exclude PPG's preferred embodiment from the patent, a result that is "rarely, if ever, correct." *Vitronics Corp. v. Concept, Inc.*, 90 F.3d 1576, 1583, 39 USPQ2d 1573, 1578 (Fed. Cir. 1996).

PPG's argument is that the preferred embodiment described in the '886 patent is made by the float process, uses sulfate as a melting and fining aid, and can therefore be expected to have a tin layer containing iron sulfide, just as SMG glass does.

The problem with PPG's argument is that the claim construction adopted by the dis-

trict judge did not exclude from coverage all glass products that contain some amount of iron sulfide. The district judge properly recognized that the patent is silent about iron sulfide and about what constitutes a material effect on the properties of the glass. The court properly left it to the jury to determine whether the amounts of iron sulfide in SMG glass have a material effect on the basic and novel characteristics of the glass. PPG did not prove that its preferred embodiment would necessarily be excluded by the claim construction given to the jury.

III

PPG's final argument is that even if the district court's claim construction was correct, the verdict of non-infringement must be overturned because a reasonable jury could not have found that the iron sulfide residues resulting from the float glass process materially affect the basic and novel characteristics of the invention. Although it was undisputed that the iron sulfide in the SMG glass causes small changes in the transmittance and dominant wavelength of the glass, PPG contends that the jury could not properly find that those changes were material for purposes of determining whether the colorant portion of the SMG glass "consist[ed] essentially of" the ingredients listed in claim 4 of the '886 patent.

[4] Although the evidence was in conflict on this point, there was substantial evidence from which the jury could conclude that the iron sulfide in SMG glass had a material effect on the basic and novel properties of the glass. Guardian introduced evidence that those of skill in the art would regard even small changes in the color or transmittance of tinted glass to be material. At one point, that view was apparently shared by PPG's witnesses. Guardian introduced deposition testimony from a PPG expert witness to the effect that he considered any "measurable" change in color or transmittance to be material or significant. Moreover, Guardian's technical expert elaborated that one of skill in the art would consider measurable, reproducible changes that are "distinctly bigger" than could be expected from experimental error to be material. Guardian's plant manager also testified as to why small but measurable changes in glass properties are important to those of skill in the art. Accordingly, although the evidence showed that the effects of the iron sulfide in SMG glass were small, there was sufficient evidence from which the jury could find that the effects were material.

In response to the argument that SMG glass is identical to the preferred embodiment in PPG's patent, Guardian distinguished SMG glass by introducing evidence that it uses 500% more sulfate as a batch material in producing SMG glass. Although most of the sulfate dissipates as a gas, Guardian's evidence showed that SMG glass retains approximately 40% more sulfate than the preferred embodiment. The jury was entitled to credit that evidence over contrary evidence adduced by PPG, which tended to show that the effect of iron sulfide in SMG glass and the preferred embodiment of the patent were identical in most respects. We therefore must uphold the jury's conclusion that SMG glass does not infringe claim 4 of the '886 patent because the colorant portion of the SMG glass does not "consist essentially of" the listed ingredients.

AFFIRMED.

Michel, J., dissenting.

I cannot join the majority opinion which upholds a jury verdict of non-infringement which no reasonable jury could have reached. Our precedent is well settled that when a chemical invention is claimed using "consisting essentially of" language, the mere presence of an additional, unclaimed substance — here, iron sulfide — does not avoid infringement unless it has a "material" effect on the basic and novel properties of the claimed invention. No reasonable jury could hold that an alteration in the dominant wavelength of the glass from approximately 500 to approximately 503 nanometers, and alterations in the ultraviolet and visible light transmittance on the order of 0.5% represent a material effect on the properties of the glass considered in light of the patent. The specification recites a range of 495 to 535 nanometers and the specific language of the claim describes a glass with ultra-violet transmittance of no greater than 31% and visible light transmittance of at least 70%. The written description specifies that sodium sulfate, the precursor of the non-claimed iron sulfide, is to be used as a fining agent in heating the ingredients of the glass and does not have a material effect on transmittance properties.

I believe that if the court had provided a proper definition of materiality in its jury instructions, a finding of infringement would have resulted. Similarly, if on post-trial motion for judgment as a matter of law of literal infringement the court had

applied the correct definition of materiality in the context of the claims and written description of this patent, it would have granted the motion. Because the court did neither, I would reverse and direct the district court to enter a liability judgment of literal infringement and proceed to decide damages.

U.S. District Court District of Puerto Rico

Upjohn Co. v. MOVA Pharmaceutical Corp.

No. 95-1378 (PG)

Decided August 17, 1998

Amended August 25, 1998

PATENTS

1. Infringement — Doctrine of equivalents — In general (§120.0701)

Substantial evidence supports jury's verdict that accused drug for treatment of diabetes does not infringe patented formulation under doctrine of equivalents, since there was extensive testimony from fact and expert witnesses, describing in detail differences between spray-dried lactose required by claims and equivalent ingredient in accused formulation, on which jury could have based its verdict, since there was considerable evidence presented concerning combination of ingredients in accused drug, and since there was substantial evidence concerning differences in manner in which accused formulation performs function of rapid dissolution.

2. Patentability/Validity — Obviousness — Combining references (§115.0905)

Substantial evidence supports jury's verdict that invention of patent claiming spray-dried lactose formulation of micronized glyburide, used for treatment of diabetes, would have been obvious to one of ordinary skill in art, since scope and content of prior art included all of claimed ingredients, including spray-dried lactose and micronized glyburide, since there was evidence that prior art included patents containing more than 70 percent spray-dried lactose and micronized anti-diabetic active ingredients, as required by claims, and since there was substantial evidence from which jury could conclude that person of ordinary skill in art would have been motivated to make claimed combination, and would have reasonably expected combination to work for its intended purpose.

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